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TM 1088 002 00

Business Management Game, Part III
Instructions for the Use and Modification
of Program UMPIRE

TECHNICAL MEMORANDUM

(TM Series)

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Business Management Game, Part III:
Instructions for the Use and Modification
of Program UMPIRE

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PREFACE

This document describes the use, modification and maintenance of program UMPIRE, a program written in JOVIAL for the Philco 2000, to be used in the play of the management game described in TM-1088. The program can be used to replace some of the manual operations involved in umpiring for this game, which is based on the Andlinger- Green game described in the Harvard Business Review for March and April, 1958 by G. R. Andlinger.

While the document describes in some detail those umpiring functions which are unique to the use of the program, it relies heavily on TM-1088 and TM-1088/001/00 for precise descriptions of those functions which are common to players and umpires or to umpires with and without the program. Since the program does not deal with the financial statements, those aspects of umpiring which are concerned with them are not covered.

The author wishes to thank Richard Gilinsky and Patricia Kenney for their constant assistance and advice in the writing and checkout of program UMPIRE.

Sandra Peterson

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BUSINESS MANAGEMENT GAME, PART III:
INSTRUCTIONS FOR THE USE AND MODIFICATION OF PROGRAM UMPIRE

1. GENERAL

1.1 RESPONSIBILITIES

The responsibilities of the umpires when the automated umpiring function is used are somewhat different from their responsibilities when the umpiring function is entirely manual. The umpires, should, however, acquaint themselves with the responsibilities of the umpires in the manual circumstance.

1.2 FUNCTIONS

The functions of the umpires in the automated umpiring mode of play encompass three of the six functions listed in volume two of this document, with one additional function.

1.2.1 Market

The following functions which deal with the market must be performed manually by the umpires:

- a. Arraying the market initially.
- b. Decreasing the market as a result of sales.
- c. Updating the market for the next quarter.

1.2.2 Sales

The following functions with respect to sales must be performed by the umpires:

- a. Determining product improvement on the basis of R and D investment.
- b. Determining sales probability based on advertising and product improvement.
- c. Determining sales.
- d. Splitting sales if more than one company sells to a customer.

1.2.3 Consulting

The umpires must provide consulting services for the players when they communicate their decision to purchase it by indicating its cost on the Quarterly Report.

1.2.4 Communication with the Computer

The umpires are responsible for communicating player and umpire decisions to the computer for each team. The computer program UMPIRE will then produce correct Quarterly Reports to be returned to the Board of Directors before the next quarter begins.

1.3 ALLOCATION OF FUNCTIONS

The various functions performed by the umpires may be allocated in any convenient way. If the umpires are located at any distance from the computer, however, it is advisable to locate an umpire at the computer to receive inputs by telephone. It is estimated that one umpire will be needed (aside from the umpire at the computer) for four teams or fewer; if from 5 to 7 teams are playing, two umpires will be needed.

1.4 RESTRICTIONS

The computer program UMPIRE imposes restrictions on three areas of the game. The restrictions can be changed easily by slight program modifications. (See Appendix III).

1.4.1 Number of Teams

The program currently provides for a maximum of seven teams playing the game.

1.4.2 Copies of Quarterly Report

The line printer which is used by program UMPIRE to produce copies of the correct Quarterly Report to be returned to the players will handle two types of paper: no carbon, or one carbon (the latter is referred to as "two part" paper). If no carbon is used, three copies of the Quarterly Report for each team will be produced. If carbon is used, six copies will be produced.

1.4.3 Sales

The program currently provides that one team may make sales to no more than 10 customers in any one quarter.

2. STARTING POSITION

Copies of the program UMPIRE are available to provide for two starting positions at the beginning of play. It is possible to modify the program to begin at other points. (See Appendix III).

2.1 NEW CORPORATION

The game begins with all corporations just starting in business. To play the game with this beginning position, use UMPIRE deck 1.

2.2 NEW MANAGEMENT OF OLD CORPORATION

The game begins with each Board of Directors assuming control of a corporation which has been operating for some length of time. Deck 2 of program UMPIRE is set up to begin at quarter 20, according to the history and starting Quarterly Report shown in Appendix I and Appendix II, respectively, of volume one of this document. The game board at the beginning of play is illustrated in Appendix III of volume one of this document. If this starting position is to be used, the umpires should consult section 2.2 of volume one to insure that the players are given sufficient beginning information.

3. MARKET

The activities which the umpires must perform in conjunction with the market are identical to those which must be performed in the case of completely manual umpiring. The description of these activities and the explanation of the methods can be found in section 3 of TM-1088/001/00.

4. SALES

The functions of the umpires in the area of sales are identical to those performed in the completely manual method of umpiring. Instructions for these functions can be found in section 5 of TM-1088/001/00.

5. CONSULTING

The consulting services which the umpires must provide in this umpiring mode are the same as those performed in the manual umpiring mode, and can be found in section 7 of volume one of this document.

6. COMMUNICATION WITH THE COMPUTER

Program UMPIRE is designed to operate on the Philco 2000 computer, located in the SSRL facility in Santa Monica. It assumes responsibility for all of the umpiring functions in the areas of Costs and Computations, as well as the responsibility for determining salesman losses. There are several umpire responsibilities which must be performed in order for the program to perform its duties correctly.

6.1 LOADING THE PROGRAM

When the umpires are ready for the program to perform its duties for the first time, they must load the program into the core memory of the computer. The umpire need only present the correct deck of UMPIRE (deck 1 for new corporation, deck 2 for quarter 20) to the computer operator to be loaded. The program will begin operating once it is loaded.

6.2 INPUTS

The program will ask certain questions via the typewriter at the computer console. The umpires should provide answers to the questions on the typewriter. All answers will be numbers. A sample of the typewriter messages and responses may be found in Appendix I.

6.2.1 General Rules

Each time the program asks a question, it will type out the question and provide a carriage return and shift to upper case. In providing his response, the umpire should do the following.

- a. Type the correct number and hit Carriage Return.
- b. If an error is made, hit the Stop Code button. Begin the response again. If an error is noticed after the Carriage Return, it is impossible to recover. Because of this, care should be used in entering values.

6.2.2 Number of Teams

In the first quarter to be played, the first question to be asked by the program is "HOW MANY TEAMS ARE PLAYING." Respond with a one digit number from 1 to 7 and hit Carriage Return. This question will be asked only once.

6.2.3 Quarter Number

At the beginning of each quarterly running of the umpiring program, the following two lines will be typed:
"PLEASE ENTER THE FOLLOWING VALUES"
"QUARTER NUMBER"

The umpire should respond with the correct quarter number, and a Carriage Return. If play begins with a new corporation, the first quarter number should be 1. If deck 2 is used, the first quarter number should be 20.

6.2.4 Units Scheduled

After the Quarter Number has been entered, the program will begin to ask questions for each of the teams in sequence, from team 1 to the largest team number. All questions will be asked for team 1, then all questions for team 2, etc.

As UMPIRE begins the processing for each team, it will type the following lines:

"FOR TEAM " (the team number will be filled in)
"UNITS SCHEDULED"

The umpire should respond with the number entered by the players on the "Units Scheduled" line on page one of the Quarterly Report. If no number has been entered on the Quarterly Report, enter zero. Follow the entry with a Carriage Return.

6.2.5 Factoring

The next questions asked by UMPIRE for the team currently being processed deal with "Current Factoring" specifications as found on the Quarterly Report. The following lines will be typed:

- a. "BLOCK 2 FACTORING" The response must be the "Cash to be Realized" item listed on the "A/R Block 2 @ 90%" line of the Quarterly Report form. It is important to note that the response must be in dollars to be realized, not in number of units factored. Carriage Return will cause the next question to be typed.
- b. "BLOCK 3" The response must be the "Cash to be Realized" item on the "A/R Block 3 @ 90%" line on the Quarterly Report form, followed by a Carriage Return.
- c. "BLOCK 4" The response must be the "Cash to be Realized" item on the "A/R Block 4 @ 80%" line on the Quarterly Report form, followed by a Carriage Return.
- d. "BLOCK 5" The response must be the "Cash to be Realized" item on the "A/R Block 5 @ 80%" line on the Quarterly Report form, followed by a Carriage Return.

In all cases, if no entry has been made on the Quarterly Report form in the position specified, enter zero and hit Carriage Return

6.2.6 Construction

The next line to be typed by UMPIRE is as follows: "CONSTRUCTION." The umpire should respond with the total cost of construction in this quarter for the team being processed. The value can be found on the "Construction" line of the Quarterly Report form. Enter the value and Carriage Return.

6.2.7 Hiring

The next inquiry is made with respect to the hiring decisions made by the team members. The line typed is: "HIRING." The umpires should respond with the total cost of the hiring done by the team. The information can be found on the "Hiring" line under Disbursements on the Quarterly Report form. Enter the value and hit Carriage Return.

6.2.8 R and D

UMPIRE next requests the expenditures of the corporation in this quarter on R and D. The line typed by UMPIRE is: "R AND D." The umpire should respond with the value found on the "R & D" line under Disbursements on the Quarterly Report and a Carriage Return.

6.2.9 Consulting

The information requested by UMPIRE at this point is the total cost of consulting services requested in the current quarter by the team being processed. The umpire has the responsibility of checking the computation of total consulting costs. When the program types "CONSULTING" respond with the total consulting fees found on the "Consulting Fees" line under Disbursements on the Quarterly Report and a Carriage Return.

6.2.10 Advertising

UMPIRE will next type "ADS." The umpire must respond with the total pages of ads found to the left of the "Pages of Ads" line under Disbursements on the Quarterly Report form. It is important to note that pages, and not dollars, is the unit of the response to this query. Follow the response with a Carriage Return.

6.2.11 Sales

In the area of sales the program will, under certain circumstances, make more than one request for information. The following lines are typed by UMPIRE:

- a. "SALES" The umpire should respond with the total sales made by the team in the current quarter. The information can be found on page two of the Quarterly Report, on the "Units Sold" line. Hit Carriage Return.
- b. If the response made to "SALES" was not zero, UMPIRE will type the following message:
"CUSTOMERS AND UNITS SOLD." The umpire is expected to respond by:
 - 1) Entering the number of the customer to whom a sale was made followed by a Carriage Return.
 - 2) Entering the number of units sold to this customer by the company being processed followed by a Carriage Return.
 - 3) Repeating 1) and 2) until all customers to whom sales were made by the company being processed and the number of units sold to them have been listed.
 - 4) If sales were made to 10 customers by the company, the sequence will automatically end and UMPIRE will go to its next message.
 - 5) If fewer than 10 customers were listed, the umpire must terminate the sequence by entering customer number zero and hitting Carriage Return.
 - 6) UMPIRE will not accept more than 10 customers and units sold for any one team.

6.2.12 Product Improvement

The next line typed by UMPIRE reads:
"PRODUCT IMPROVEMENT, 1 OR 0 " The umpire should respond by entering 1 and Carriage Return if the team achieved a product improvement in the current quarter, or 0 and Carriage Return if no product improvement was achieved.

6.2.13 Production Lines Junked

The next message typed by UMPIRE is:
" PROD LINES JUNKED." The umpire is expected to respond with the number of production lines junked by the team during the current quarter. This information can be found on page one of the Quarterly Report on the "Production Line Scrapped" line. If no entry was made by the team, enter zero. The umpire must provide a Carriage Return.

6.3 OUTPUTS

The program UMPIRE will provide outputs of two kinds.

6.3.1 Sales Error

Since UMPIRE keeps records of the number of units each team has in inventory, it can recognize the fact that the sales assigned to a team exceed the inventory of that team. If this occurs, UMPIRE will reduce the total sales to the number of units in inventory, but will not change the listing of the customers and the units sold to them. The umpire must correct this item himself. UMPIRE will warn the umpire located at the console typewriter that this error has occurred by typing the following message before the next team is processed: "SALES HAVE BEEN REDUCED TO THE NUMBER OF UNITS IN INVENTORY."

6.3.2 Quarterly Report

Program UMPIRE produces a quarterly report for each team. (See Section 1.4.2). After processing all teams for one quarter, UMPIRE will stop. At this time, the computer operators should be instructed to print the PRINT tape. The output will be the quarterly reports for all the teams playing. A sample of the Quarterly Report printed by UMPIRE will be found in Appendix II.

6.4 RESTARTING UMPIRE

In order to restart UMPIRE for the next quarter, the umpire need only instruct the computer operator to "advance" the computer. UMPIRE will continue with the messages "PLEASE ENTER THE FOLLOWING VALUES" and "QUARTER NUMBER." It is important to note that the computer must remain idle until subsequent quarters are to be played. Due to its responsibilities for "remembering," UMPIRE may not be removed from memory between quarters of play.

7. GAME BOARDS

The umpires are responsible for keeping their game boards for the teams updated according to the decisions made by the team members, the umpires' decisions, and the decisions made by UMPIRE. On receiving copies of the completed Quarterly Report from UMPIRE, the umpires should pay particular attention to the salesman losses, and record these events on the game board.

8. EQUIPMENT

The umpires should have the same equipment available to them as described in section 8 of volume one of this document.

9. SEQUENCE

The sequence of activities to be followed by the umpires is as listed in this section. References made are to other sections of this document which describe the particular function in greater detail.

Umpiring ActivitiesReferences

9.1 BEFORE PLAY BEGINS

- 9.1.1 Array the market
- 9.1.2 Set up game boards

TM-1088/001/00 Section 3.2

- a. Quarter 1 boards are empty
- b. Quarter 20

TM-1088/001/00, Appendix III

9.2 AFTER BOARD MEETING

- 9.2.1 Determine accumulated R & D
- 9.2.2 Determine product improvement (5.1.4)
- 9.2.3 Determine sales probabilities
- 9.2.4 Determine sales
- 9.2.5 Determine split sales
- 9.2.6 Document sales
- 9.2.7 Record team decisions on board

TM-1088/001/00, Section 5.1 1
 TM-1088/001/00, Section 5.1 2
 TM-1088/001/00, Section 5.2
 TM-1088/001/00, Section 5.3
 TM-1088/001/00, Section 5.4
 TM-1088/001/00, Section 5.5
 TM-1088/000/00, Section 15

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- a. Current factoring
- b. Construction
- c. Salesman hire
- d. Units scheduled
- e. Production lines scrapped

9.2.8 Run program UMPIRE
9.2.9 Update market for next quarter
9.2.10 Complete consulting forms
9.2.11 Receive QRs from UMPIRE
9.2.12 Update game board
9.2.13 Give UMPIRE QR, consulting
forms and blank QR to players

Section 6
TM-1088/001/00, Section 3.4
TM-1088/001/00, Section 7
Section 6
TM-1088/000/00, Section 15

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APPENDIX I

UMPIRE MESSAGES

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UMPIRE
HOW MANY TEAMS ARE PLAYING
2

PLEASE ENTER THE FOLLOWING VALUES
QUARTER NUMBER
1

FOR TEAM 1
UNITS SCHEDULED
0

BLOCK 2 FACTORING
0

BLOCK 3
0

BLOCK 4
0

BLOCK 5
0

CONSTRUCTION
180000

HIRING
50000

R AND D
5000

CONSULTING
0

ADS
0

SALES
0

PRODUCT IMPROVEMENT, 1 OR 0
0

PROD LINES JUNKED
0

FOR TEAM 2
UNITS SCHEDULED
0

BLOCK 2 FACTORING
0

BLOCK 3
0

BLOCK 4
0

BLOCK 5
0

CONSTRUCTION

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Note that this entry is an error, and that the corresponding Quarterly Report in Appendix II shows "0" total salesmen.

150000

HIRING
3000

R AND D
5000

CONSULTING
0

ADS
0

SALES
0

PRODUCT IMPROVEMENT, 1 OR 0
0

PROD LINES JUNKED
0

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PH1 BGN
SSRL
PH1 END
PH2 BGN

SYBP 01

PH3 BGN

UMPIRE
HOW MANY TEAMS ARE PLAYING
2

PLEASE ENTER THE FOLLOWING VALUES
QUARTER NUMBER
20

FOR TEAM 1
UNITS SCHEDULED
7

BLOCK 2 FACTORING
18000

BLOCK 3
27000

BLOCK 4
16000

BLOCK 5
24000

CONSTRUCTION
0

HIRING
0

R AND D
5000

CONSULTING
2000

ADS
5

SALES
10

CUSTOMERS AND UNITS SOLD
2

3

5

4

16

3

0

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PRODUCT IMPROVEMENT, 1 OR 0
1

PROD LINES JUNKED
0

FOR TEAM 2
UNITS SCHEDULED
10

BLOCK 2 FACTORING
0

BLOCK 3
0

BLOCK 4
80000

BLOCK 5
0

CONSTRUCTION
0

HIRING
10000

R AND D
0

CONSULTING
0

ADS
3

SALES
9

CUSTOMERS AND UNITS SOLD
4

2

6

1

7

1

10

1

12

2

21

2

0

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PRODUCT IMPROVEMENT, 1 OR 0
0

PROD LINES JUNKED
0

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APPENDIX II

UMPIRE QUARTERLY REPORT

[illegible]

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QLA 14 Y REPORT

TEAM NUMBER 2 QUARTER NUMBER #1

		SALES		M AND D	
		CUSTOMER	UNITS SOLD	ACCUMULATED M AND D	5000
STARTING CASH ITEMS					
BEGINNING CASH		400000			5000
MATURED A/R AT PAR		0			
FROM PAST FACTORING		0			
TOTAL AVAILABLE CASH		400000			
CURRENT FACTORING					
AT 90 PERCENT BLOCK 2		0			
BLOCK 3		0			
AT 90 PERCENT BLOCK 4		0			
BLOCK 5		0			
TOTAL FACTORED A/R		0			
DISBURSEMENTS		TOTAL SALES		0	
FIXED COST		0	PRODUCTION		
VARIABLE COST		0	UNITS IN INVENTORY	0	
SALES SALARIES		0	UNITS IN WIP	0	
CONSTRUCTION COST		150000			
SALESPER MILE		3000	PERSONNEL		
M AND D EXPENSE		3000	SALESMEN LOST		
ADVERTISING EXPENSE		0	IN THE FIELD	0	
CONSULTING FEES		0	IN TRAINING	0	
TOTAL DISBURSEMENTS		150000	BLOCK 3	0	242000
CASH LESS DISBURSEMENTS		242000	BLOCK 4	0	0
			IN WIP	0	0
PLANT VALUE		150000	TOTAL SAL-SM-M	0	242000

PRODUCT IMPROVEMENT NOT ACHIEVED

QUARTERLY REPORT

TEAM NUMBER 1 CHARTER NUMBER 20

STARTING CASH ITEMS		SALES		R AND D	
	102000	CUSTOMER	UNITS SOLD	ACCUMULATED W AND L	U
BEGINNING CASH	80000	2	3	PRODUCT IMPROVEMENT	ACHIEVED
MATURED A/R AT PAR	0	5	4		
TRIP PAST FACTORING	102000	10	3		
TOTAL AVAILABLE CASH					
CURRENT FACTORING					
AT 90 PERCENT BLOCK 2	10000				
BLOCK 3	20000				
AT 90 PERCENT BLOCK 4	10000				
BLOCK 5	20000				
TOTAL FACTORING A/R	80000				
DISBURSEMENTS					
		TOTAL SALES	10		
FIXED COST	10000	PRODUCTION			
VARIABLE COST	10000	UNITS IN INVENTORY	15		
SALES SALARIES	2000	UNITS IN WIP	7		
CONSTRUCTION COST	0	PERSONNEL			
SALESMAN WIP	0	SALESMEN LOST			
R AND D EXPENSE	2000	IN THE FIELD	0		
ADVERTISING EXPENSE	10000	IN TRAINING BLOCK 2	0		
CONSULTING FEES	4000	BLOCK 3	0		
TOTAL DISBURSEMENTS	62000	BLOCK 4	0		
		BLOCK 5	0		
CASH LESS DISBURSEMENTS	121600	IN MINING	0		
		TOTAL SALES	5		
PLANT VALUE	100000	TOTAL AVAILABLE CASH			

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QUARTERLY REPORT									
TEAM NUMBER 2		QUARTER NUMBER 20							
STARTING CASH ITEMS		SALES		H AND D					
BEGINNING CASH	10000	CUSTOMER	UNITS SOLD	ACCUMULATED H AND D				0	
PAYMENT A/R AT PAM	0	4	2	PRODUCT IMPROVEMENT NOT ACHIEVED					
FROM PAST FACTORING	0	6	1						
TOTAL AVAILABLE CASH	10000	7	1						
		10	1						
CURRENT FACTORING									
AT 90 PERCENT BLOCK 2	0	12	2						
BLOCK 3	0	21	2						
AT 80 PERCENT BLOCK 4	0								
BLOCK 5	0								
TOTAL FACTORED A/R	0								
DISBURSEMENTS									
FIXED COST	14400	TOTAL SALES		6					
VARIABLE COST	10000	PRODUCTION							
SALER SALARIES	5000	UNITS IN INVENTORY		10					
CONSTRUCTION COST	0	UNITS IN WIP		10					
DEALERMAN MILE	10000	PERSONNEL							
H AND D EXPENSE	0	SALESMEN LOST							
ADVERTISING EXPENSE	9000	IN THE FIELD		0				FOR QUARTER NUMBER 21	
CLASSICAL FEES	0	IN TRAINING		BLOCK 2		0		STARTING CASH ITEMS	
TOTAL DISBURSEMENTS	58200	BLOCK 3		0				BEGINNING CASH	
CASH LESS DISBURSEMENTS	124600	BLOCK 4		0				MATURED A/R AT PAM	
		IP MILING		0				FROM PAST FACTORING	
PLANT VALUE	190000	TOTAL SALESMEN		0				TOTAL AVAILABLE CASH	
								234600	

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APPENDIX III

MODIFICATIONS TO PROGRAM UMPIRE

The program modifications provided in this Appendix will serve to change the following limitations currently imposed by the program:

- 1) The number of teams playing.
- 2) The number of copies of the Quarterly Report produced.
- 3) The starting position of the teams.

The restriction to 10 customers sold per team per quarter is not easily modified, and will therefore not be included herein.

General

In general, the program modifications described here will require that the JOVIAL deck of the program be modified and re-compiled. The deck exists in two parts, each of which must be compiled separately. The last binary card produced by Part I must be removed and the two binary decks must be put together to produce the binary deck of UMPIRE for loading and operating. The modifications described here will all be done to the second part of the deck.

Number of Teams

In order to increase the maximum number of teams playing the game, the following changes must be made to the second part of the UMPIRE JOVIAL deck:

- 1) Replace the card reading as follows:
TABLE QR V 7 S D \$
with a card reading as follows:
TABLE QR V n S D \$ where n=maximum number of teams playing.
- 2) Replace the card reading as follows:
TABLE BOARD V 7 S D \$
with a card reading as follows:
TABLE BOARD V n S D \$ where n=maximum number of teams playing.
- 3) Alter preset cards as described below under "Starting Position."

Copies of Quarterly Report

In order to increase or decrease the number of copies of the Quarterly Report produced by program UMPIRE, the following change must be made:

In the Procedure defined by the following card:

PROC I'O'FOUR(INDEX) \$

change the card currently reading as follows:

FOR J=0,1,2 \$

to read as follows:

FOR J=0,1,n \$ where n=the number of copies desired minus one.

This limit applies when no carbon paper is used on the printer. If two-part paper is used, twice as many copies will, of course, be produced.

Starting Position

Modifications to provide that the game begin at other points in time are more extensive than those described above, and require that the game actually be played up to the beginning point, with the board and Quarterly Report being maintained through this playing. It further requires, as does the changing of the number of teams, that the preset data for the items in the tables QR and BOARD be changed.

1) Preset Values

The preset values for the items listed below must be changed to reflect the situation at the beginning of the first quarter to be played. Other items need not be changed.

- a. BC 'CSH should reflect the Beginning Cash shown on the Quarterly Report for the first quarter to be played.
- b. AR'PAR should reflect the Matured A/R @ \$10,000 line under Starting Cash on the Quarterly Report for the first quarter to be played.
- c. P'FACTR should reflect the Previous Factored A/R line under Starting Cash on the Quarterly Report for the first quarter to be played.
- d. T'AV'CA should reflect the Total line under Starting Cash on the Quarterly Report for the first quarter to be played.
- e. AR' should reflect the number of units in the second block (Block 2) in the Accounts Receivable column on the game board at the beginning of the first quarter to be played.

- f. AR'3 should reflect the number of units in the third block (Block 3) in the Accounts Receivable column on the game board at the beginning of the first quarter to be played.
- g. AR'4 should reflect the number of units in Block 4 in the Accounts Receivable column on the game board at the beginning of the first quarter to be played.
- h. AR'5 should reflect the number of units in Block 5 of the Accounts Receivable column on the game board at the beginning of the first quarter to be played.
- i) INVTY should reflect the number of units in the Inventory block of the Production column on the game board at the beginning of the first quarter of play.
- j) WIP should reflect the number of units in the Work in Process block of the Production column on the game board at the beginning of the first quarter of play.
- k) OS'1 should reflect the number of units in the first block of the Construction column on the game board at the beginning of the first quarter of play.
- l) CON'2 should reflect the number of units in the second block of the Construction column on the game board at the beginning of the first quarter of play.
- m) CON'3 should reflect the number of units in the third block of the Construction column on the game board at the beginning of the first quarter of play.
- n) FLD'1 should reflect the number of units in the field block (Block 1) of the Salesmen column on the game board at the beginning of the first quarter of play.
- o) TRNG'2 should reflect the number of units in the second block of the Salesmen column on the game board at the beginning of the first quarter of play.
- p) TRNG'3 should reflect the number of units in the third block of the Salesmen column on the game board at the beginning of the first quarter of play.

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- q) TRNG'4 should reflect the number of units in the fourth block of the Salesmen column on the game board at the beginning of the first quarter of play.

2) Preset Cards

The preset cards must conform to the following restrictions:

- a) The cards must be punched only in columns 1 through 72.
- b) The constants for preset must be punched as many times as the maximum number of teams playing.
- c) The constants must be legal JOVIAL arithmetic constants with no fractional bits.

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APPENDIX IV

PROGRAM LISTINGS

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PART I

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START ITEM UMPYRE A 7 U S			
ITEM QTRONE B P 1 S			
ITEM TEMP A 48 S S			
ITEM TEAMANO H 10 P 10H(FOR TEAM) S			
ITEM RESPOND H 8 S			
ITEM BLANK H 10 P 10H() S			
ITEM QN3 H 112 P			112H(
	QUARTERLY REPORT		
	) S		
ITEM QR6 H 112 P			112H(
	TEAM NUMBER	QUARTER NUMBER	
	) S		
ITEM QR10 H 112 P			112H(
STARTING CASH ITEMS	SALES		
H AND C	) S		
ITEM QR12 H 112 P			112H(
BEGINNING CASH		CUSTOMER	UNITS SOLD
ACCUMULATED H AND D	) S		
ITEM QR14 H 112 P			112H(
MATURED A/R AT PAH			
PRODUCT IMPROVEMENT	ACHIEVED	) S	
ITEM QR16 H 112 P			112H(
FROM PAST FACTORING	) S		
ITEM QR18 H 112 P			112H(
TOTAL AVAILABLE CASH	) S		
ITEM QR20 H 112 P			112H(
	) S		
ITEM QR21 H 112 P			112H(
CURRENT FACTORING	) S		
ITEM QR22 H 112 P			112H(
	) S		
ITEM QR23 H 112 P			112H(
AT 90 PERCENT BLOCK 2	) S		
ITEM QR24 H 112 P			112H(
	) S		
ITEM QR25 H 112 P			112H(
BLOCK 3	) S		
ITEM QR26 H 112 P			112H(
	) S		
ITEM QR27 H 112 P			112H(
AT 80 PERCENT BLOCK 4	) S		
ITEM QR28 H 112 P			112H(
) S		
ITEM QR29 H 112 P			112H(
BLOCK 5) S		
ITEM QR30 H 112 P			112H(
) S		

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ITEM QR31 W 112 P		112M1
TOTAL FACTORED A/R) \$	
ITEM QR32 W 112 P		112M1
) \$	
ITEM QR34 W 112 P		112M1
DISBURSEMENTS	TOTAL SALES	
) \$	
ITEM QR36 W 112 P		112M1
FIXED COST) \$	
ITEM QR37 W 112 P		112M1
	PRODUCTION	
) \$	
ITEM QR38 W 112 P		112M1
VARIABLE COST) \$	
ITEM QR39 W 112 P		112M1
	UNITS IN INVENTORY	
) \$	
ITEM QR40 W 112 P		112M1
SALES SALARIES) \$	
ITEM QR41 W 112 P		112M1
	UNITS IN WIP	
) \$	
ITEM QR42 W 112 P		112M1
CONSTRUCTION COST) \$	
ITEM QR44 W 112 P		112M1
SALESMAN HIRE	PERSONNEL	
) \$	
ITEM QR46 W 112 P		112M1
H AND D EXPENSE	SALESMEN LOST	
) \$	
ITEM QR47 W 112 P		112M1
FOR QUARTER NUMBER) \$	
ITEM QR48 W 112 P		112M1
ADVERTISING EXPENSE	IN THE FIELD	
) \$	
ITEM QR50 W 112 P		112M1
CONSULTING FEES	IN TRAINING BLOCK 2	
STARTING CASH ITEMS) \$	
ITEM QR52 W 112 P		112M1
TOTAL DISBURSEMENTS	BLOCK 3	
REGINATING CASH) \$	
ITEM QR54 W 112 P		112M1
	BLOCK 4	
) \$	
REMOVED A/R AT PAN		
ITEM QR55 W 112 P		112M1
CASH LESS DISBURSEMENTS) \$	
ITEM QR56 W 112 P		112M1
	IN HIRING	
) \$	
FROM PAST FACTORING		
ITEM QR58 W 112 P		112M1
PLANT VALUE	TOTAL SALESMEN	
TOTAL AVAILABLE CASH) \$	

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TERM S

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PART II

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```
START ITEM UNPICK A 7 U S
ITEM GYRONE B 5
ITEM TEMP A 48 S S
ITEM TEAMING M 10 S
ITEM RESPOND M 8 S
ITEM BLANK M 10 S
ITEM GR3 M 112 S
```

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ITEM QR6 M 112 8
ITEM QR10 M 112 8
ITEM QR12 M 112 8
ITEM QR14 M 112 8
ITEM QR16 M 112 8
ITEM QR18 M 112 8
ITEM QR20 M 112 8
ITEM QR21 M 112 8
ITEM QR22 M 112 8
ITEM QR23 M 112 8
ITEM QR24 M 112 8
ITEM QR25 M 112 8
ITEM QR26 M 112 8
ITEM QR27 M 112 8
ITEM QR28 M 112 8
ITEM QR29 M 112 8
ITEM QR30 M 112 8
ITEM QR31 M 112 8
ITEM QR32 M 112 8
ITEM QR34 M 112 8
ITEM QR36 M 112 8
ITEM QR37 M 112 8
ITEM QR38 M 112 8
ITEM QR39 M 112 8
ITEM QR40 M 112 8
ITEM QR41 M 112 8
ITEM QR42 M 112 8
ITEM QR44 M 112 8
ITEM QR46 M 112 8
ITEM QR47 M 112 8
ITEM QR48 M 112 8
ITEM QR50 M 112 8
ITEM QR52 M 112 8
ITEM QR54 M 112 8
ITEM QR55 M 112 8
ITEM QR56 M 112 8
ITEM QR58 M 112 8
FILE ORPRINT M 2767 R 112 V(NE) V(PE) V(OF) V(OT) V(SE) V(OC)
V(UBST) PRINT 8
TABLE COSTS R 4 8 8 ;; INDEX BY OU PLANTS ;;
BEGIN
ITEM COSTFIXED A 48 8 8
BEGIN 0,A0 0,03A0 14,003A0 22,003A0 28,003A0 31,003A0 END
ITEM COSTVAR A 48 8 8
BEGIN 0,A0 3,003A0 2,203A0 1,903A0 1,003A0 0,003A0 END
END
TABLE ON V 7 8 8 8
BEGIN
ITEM B0NJC0M A 48 8 8
BEGIN 4,003A0 4,003A0 4,003A0 4,003A0 4,003A0 4,003A0 END
ITEM ANIPAR A 48 8 8

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```
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM PIFACIR A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END JJPJFACTR;;
ITEM TJAVICA A 48 S S
BEGIN 4.E5A0 4.E5A0 4.E5A0 4.E5A0 4.E5A0 4.E5A0 4.E5A0 4.E5A0 END
ITEM BL2J90P A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM BL3J90P A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM BL4J90P A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM BL5J90P A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM ARJFACT A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM FXJCSOT A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM VJCSOT A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM SALARY A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM CONSTR A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM WIRE A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM RD A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM ADS A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM CONSULT A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM DISBURS A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM CAJLIDB A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM PAGES A 10 U S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM SALES A 10 U S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM MEN A 10 U S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM CUMJRD A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM IMPRV U S
BEGIN 0 0 0 0 0 0 0 0 END JJPOR IMPRV;;
ITEM FLDJLST A 10 U S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM BL2JLST A 10 U S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM BL3JLST A 10 U S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM BL4JLST A 10 U S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM WIRJLST A 10 U S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
ITEM PLJVAL A 48 S S
BEGIN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 END
```

ENC
TABLE BCARD V 7 S D S
BEGIN

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[illegible]

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```

SICP FIRST S
ENC JUMPIREJ
PRCC ACTREC(INDEX) S JICOMPUTES FACTORED A/R CORRECTS FOR OVER-FACTORJ
ITEM INDEX A 48 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    IF BL2J90P(SIS) GR 9000 * ARJ2(SIS) S
      BL2J90P(SIS) = 9000 * ARJ2(SIS) S
    IF BL3J90P(SIS) GR 9000 * ARJ3(SIS) S
      BL3J90P(SIS) = 9000 * ARJ3(SIS) S
    IF BL4J80P(SIS) GR 8000 * ARJ4(SIS) S
      BL4J80P(SIS) = 8000 * ARJ4(SIS) S
    IF BL5J80P(SIS) GR 8000 * ARJ5(SIS) S
      BL5J80P(SIS) = 8000 * ARJ5(SIS) S
    ARJFACT(SIS) = BL2J90P(SIS) + BL3J90P(SIS) + BL4J80P(SIS)
      + BL5J80P(SIS) S
    ARJ2(SIS) = ARJ2(SIS) - BL2J90P(SIS) / 9000 S
    ARJ3(SIS) = ARJ3(SIS) - BL3J90P(SIS) / 9000 S
    ARJ4(SIS) = ARJ4(SIS) - BL4J80P(SIS) / 8000 S
    ARJ5(SIS) = ARJ5(SIS) - BL5J80P(SIS) / 8000 S
  END
END
PRCC SPEND(INDEX) S
ITEM INDEX A 48 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    FXJCOST(SIS) = COST/FIXED(SOBJ1(SIS)S) S
    VJCOST(SIS) = WIP(SIS) * COST/VAR(SOBJ1(SIS)S) S
    SALARY(SIS) = 1000 * (FLD11(SIS) + TRNG12(SIS) + TRNG13(SIS)
      + TRNG14(SIS)) S
    ACS(SIS) = 3000 * PAGES(SIS) S
    DISBURS(SIS) = FXJCOST(SIS) + VJCOST(SIS) + SALARY(SIS)
      + CONSTR(SIS) + HIRE(SIS) + RD(SIS) + ADS(SIS)
      + CONSULT(SIS) S
  END
END
PRCC PRCVE(INDEX) S JIUPDATES ACCUMULATED R AND D JI
ITEM INDEX A 48 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    IF IMPRV(SIS) OR RD(SIS) EQ 0 S
      BEGIN
        CUMJRD(SIS) = 0 S
        RETURN S
      END
    CUMJRD(SIS) = CUMJRD(SIS) + RD(SIS) S
  END
END
PRCC QUITTERS(INDEX) S JICNTROLS SALESMAN LOSSESJ
ITEM INDEX A 48 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    HIRJ9(SIS) = HIRE(SIS)/10000 S
    IF FLD11(SIS) NG 0 S
      FIGURE(FLD11(SIS) + FLD11(SIS),FLD11(SIS)) S
    END
  END
END

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IF TRNG12(SIS) NO 0 S
  FIGURE(TRNG12(SIS) = TRNG12(SIS),BL2,1,LT(SIS)) S
IF TRNG13(SIS) NO 0 S
  FIGURE(TRNG13(SIS) = TRNG13(SIS),BL3,1,LT(SIS)) S
IF TRNG14(SIS) NO 0 S
  FIGURE(TRNG14(SIS) = TRNG14(SIS),BL4,1,LT(SIS)) S
IF MIR15(SIS) NO 0 S
  FIGURE(MIR15(SIS) = MIR15(SIS),MIR,1,LT(SIS)) S
END
END
PRCC FIGURE(NUMBIN = NUMBOUT,LOSSES) S ;;DETERMINES SALESMAN LOSSES;;
ITEM NUMBIN A 40 S S
ITEM NUMBOUT A 40 S S
ITEM LOSSES A 40 S S
ITEM RANDOM A 7 U S
BEGIN
  LOSSES = 0 S
  NUMBOUT = NUMBIN S
  FOR I = NUMBIN = 1, -1, 0 S
    BEGIN
      RNGEN(=RANDOM) S
      IF RANDOM LG 5 S
        BEGIN
          NUMBOUT = NUMBOUT - 1 S
          LOSSES = LOSSES + 1 S
        END
      END
    END
  END
PRCC RNGEN(=PRNUMB) S ;;PSEUDO RANDOM NUMBER GENERATOR;;
TABLE GEN R 2 S
BEGIN
  ITEM NGEN A 40 S S
  BEGIN 0(0429434430110479) 0(1272343473274294) END
END
ITEM PRNUMB A 7 U S ;;OUTPUT PARAMETER;;
ITEM TEMPRN A 40 S S
BEGIN
  CGEN, TEMPRN = NGEN(SOS) * NGEN(SIS) S
  NGEN(SOS) = BIT(810,275)(TEMPRN) S
  PRNUMB = BIT(830,75)(NGEN(SOS)) S
  IF PRNUMB GR 99.40 S
    STOP CGEN S
END
PRCC BYD(NN)S
ITEM BYD M 8S
ITEM NN A 40 SS
ITEM XN A 40 SS
BEGIN ;;CONVERTS BINARY NN TO BCM;;
  DIRECT
    TXDLC 0,1 S
    TDM BYD.XN S
    TMA 0/0000000000000000 S
    TAM BYD.BTD S
    TIXZ 0,1 S
    CAMA BYD.NN S
    SRAQ 40 S
    DAQ 0/10 S
    AM 0/00T47 S
    SLA 0,1 S
    ANOS BYD.BTD S

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CA          S
JAGQ        (P)+3H      S
TMD         C/HLT,40)C/HLT,(P)-6MS  S
AIXJ        6,1        S
TMD         STD.XR      S
TDXLC       0,1        S

UCVIAL
ENC J:BTDSJ
PRCC DTB(MM)S
ITEM DTB A 47 US
ITEM MM M 0S
ITEM PWSTEN A 47 US
BEGIN J:CONVERT BCM MM TO BINARY WTDJ
DIRECT
CM          DTB.DTB      SCLEAR DTB.
TMA         D/1042      SGEI 1 INTJ PWSTEN FOR
TAM         DTB.PWSTENSIS1 MULTIPLICATION.
CO          SCLEAR 0.
TMA         DTB.MM      SGEI MM, CYCLE RIGHT 6
SCD         6           SAND PLACE BACK IN MM.
TDM         DTB.MM      S
SRAQ        6           SSHIFT ACTIVE BYTE
TMA         0/00        SINTO 0 SCALED 0S IN 0
JAGQ        (P)+3H      SIF BLANK, SKIP BYTE.
MM          DTB.PWSTENSMULT.BY PWSTEN SCALED
AMS         DTB.DTB      S042.PRODUCT 047 IN A.
TMO         D/10-5      SMULT PWSTEN BY 10 AND
MM          DTB.PWSTENEXIT ROUTINE WHEN
TMO         D/100       SPWSTEN*100,000,000
JAGQ        (P)+4M      SMEANING LAST BYTE.
SLA         5           SRESCALE PWSTEN TO 042
TAM         DTB.PWSTENS
JMP         (P)-15M     SREPEAT FOR NEXT BYTE.

UCVIAL
ENC J:BTDSJ
PRCC BRD(INDEX) S J:ADVANCES BOARD ITEMS AND SOME OR ITEMSJ
ITEM INDEX A 40 S S
BEGIN
FOR I = INDEX S
BEGIN
IF SALES(SIS) OR INVTY(SIS) S
BEGIN
SALES(SIS) = INVTY(SIS) S
LCG(50M(SALES HAVE BEEN REDUCED TO THE NUMBER OF UNITS IN INVEN
TORY)) S
END
INVTY(SIS) = INVTY(SIS) - SALES(SIS) S
CASHJ1(SIS) = ARJ2(SIS) S
ARJ2(SIS) = ARJ3(SIS) S
ARJ3(SIS) = ARJ4(SIS) S
ARJ4(SIS) = ARJ5(SIS) S
ARJ5(SIS) = SALES(SIS) S
MEN(SIS) = FLDJ1(SIS) + TRNGJ2(SIS) + TRNGJ3(SIS) + TRNGJ4(SIS)
+ MIRJ5(SIS) S
CAJLJDB(SIS) = TAVJCA(SIS) = DISBRJ(SIS) S
INVTY(SIS) = INVTY(SIS) + WIP(SIS) S
WIP(SIS) = SCHED(SIS) S
SCHED(SIS) = 0 S
CBJ1(SIS) = CSJ1(SIS) + CONJ2(SIS) S
CCNJ2(SIS) = CONJ3(SIS) S

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IFEITH OB1(SIS) + CON12(SIS) GO 1 S
CON13(SIS) = CONSTR(SIS)/30000 S
CRIF CONSTR(SIS) GO 150000 S
CON13(SIS) = 1 + (CONSTR(SIS) - 150000)/30000 S
CRIF CONSTR(SIS) GO 0 S
BEGIN
  CONSTR(SIS) = 0 S
  CON13(SIS) = 0 S
END
END//ALTERNATIVE//
FLD11(SIS) = FLD11(SIS) + TRNG12(SIS) S
TRNG12(SIS) = TRNG13(SIS) S
TRNG13(SIS) = TRNG14(SIS) S
TRNG14(SIS) = MIR15(SIS) S
MIR15(SIS) = 0 S
PL1VAL(SIS) = PL1VAL(SIS) + CONSTR(SIS) S
END
ENC
PRCC RESET(INDEX) S //RESETS OR FOR NEXT QUARTER//
STEP INDEX A 40 S S
BEGIN
  FOR I = INDEX S
  BEGIN
    CON1CM(SIS) = CAL1DB(SIS) S
    AR1PAR(SIS) = 10000 + CASH11(SIS) S
    P1FACTR(SIS) = AR1FACT(SIS) S
    T1AVICA(SIS) = CON1CM(SIS) + AR1PAR(SIS) + P1FACTR(SIS) S
    BL2100P(SIS) = 0 S
    BL3100P(SIS) = 0 S
    BL4100P(SIS) = 0 S
    BL5100P(SIS) = 0 S
    AR1FACT(SIS) = 0 S
    F11COST(SIS) = 0 S
    V1COST(SIS) = 0 S
    SALARY(SIS) = 0 S
    CONSTR(SIS) = 0 S
    MIR1(SIS) = 0 S
    RD(SIS) = 0 S
    ACB(SIS) = 0 S
    CONSULT(SIS) = 0 S
    DISBURS(SIS) = 0 S
    CAL1DB(SIS) = 0 S
    PAGES(SIS) = 0 S
    SALES(SIS) = 0 S
    MEN(SIS) = 0 S
    T1PRV(SIS) = 0 S
    FLD1LOT(SIS) = 0 S
    BL2LOT(SIS) = 0 S
    BL3LOT(SIS) = 0 S
    BL4LOT(SIS) = 0 S
    MIR1LOT(SIS) = 0 S
  END
END
ENC
PRCC I101ONE S
BEGIN
  LOG(20H(HOW MANY TEAMS ARE PLAYING)) S
  FLEXIN S
  KENT(OR) = DTB(RESPOND) S
END
PRCC I101TWO(INDEX) S

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STEP INDEX A 48 S S
BEGIN
  FOR I = INDEX S
  BEGIN
    IF I EQ 0 S
    BEGIN
      LOG(33M(PLEASE ENTER THE FOLLOWING VALUES)) S
      LOG(14M(QUARTER NUMBER)) S

      FLEXIN S
      BYTE (S92,25)(Q4) = RESPOND S
      TEMP = DTB(RESPOND) + 1 S
      BYTE(S92,25)(Q47) = STD(TEMP) S

    END
    BYTE(S93)(TEAMNO) = STD(I + 1) S
    LOG(TEAMNO) S
    LOG(19M(UNITS SCHEDULED)) S
    FLEXIN S
    SCHED(SIS) = DTB(RESPOND) S
    LOG(17M(BLOCK 2 FACTORING)) S
    FLEXIN S
    BL2J90P(SIS) = DTB(RESPOND) S
    LOG(7M(BLOCK 3)) S
    FLEXIN S
    BL3J90P(SIS) = DTB(RESPOND) S
    LOG(7M(BLOCK 4)) S
    FLEXIN S
    BL4J90P(SIS) = DTB(RESPOND) S
    LOG(7M(BLOCK 5)) S
    FLEXIN S
    BL5J90P(SIS) = DTB(RESPOND) S
    LOG(12M(CONSTRUCTION)) S
    FLEXIN S
    CCNSTR(SIS) = DTB(RESPOND) S
    LOG(6M(HIRING)) S
    FLEXIN S
    HIRE(SIS) = DTB(RESPOND) S
    LOG(7M(R AND D)) S
    FLEXIN S
    RC(SIS) = DTB(RESPOND) S
    LOG(10M(CONSULTING)) S
    FLEXIN S
    CCNSULT(SIS) = DTB(RESPOND) S
    LOG(3M(ADS)) S
    FLEXIN S
    PAGE8(SIS) = DTB(RESPOND) S
    LOG(9M(SALES)) S
    FLEXIN S
    SALE8(SIS) = DTB(RESPOND) S
    IF SALE8(SIS) NG 0 S
    BEGIN
      LOG(24M(CUSTOMERS AND UNITS SOLD)) S
      FOR J = 0,1,9 S
      BEGIN
        FLEXIN S
        CUST(SJS) = DTB(RESPOND) S
        IF CUST(SJS) EQ 0 S
        GOTO SET0 S
        FLEXIN S
        SOLD(SJS) = DTB(RESPOND) S
      END
    END
  END

```

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```

TEST S
SETO, FOR K = J+1, S
BEGIN
    CUST(SKS) = 0 S
    SOLD(SKS) = 0 S
END
GOTO NEXT S
END
NEXT. LOG(I7H(PRODUCT IMPROVEMENT, 1 OR 0)) S
FLEXIN S
IMPRV(SIS) = DTB(RESPOND) S
LOG(I7H(PROD LINE# JUNKED)) S
FLEXIN S
TEMP = DTB(RESPOND) S
PLJVAL(SIS) = PLJVAL(SIS) + 30000 * TEMP S
OS;1(SIS) = OS;1(SIS) + TEMP S
END
ENR
PRCC IJGJTHREE(INDEX) S
ITEM INCEX A 48 S S
BEGIN
    FOR I = INDEX S
    BEGIN
        IF CUST(S08) EQ 0 S
            GOTO S14 S
        BYTE(S40,28)(QR14) = STD(CUST(S08)) S
        BYTE(S60,28)(QR14) = STD(SOLD(S08)) S
        IF CUST(S18) EQ 0 S
            GOTO S16 S
        BYTE(S40,28)(QR16) = STD(CUST(S18)) S
        BYTE(S60,28)(QR16) = STD(SOLD(S18)) S
        IF CUST(S28) EQ 0 S
            GOTO S18 S
        BYTE(S40,28)(QR18) = STD(CUST(S28)) S
        BYTE(S60,28)(QR18) = STD(SOLD(S28)) S
        IF CUST(S38) EQ 0 S
            GOTO S20 S
        BYTE(S40,28)(QR20) = STD(CUST(S38)) S
        BYTE(S60,28)(QR20) = STD(SOLD(S38)) S
        IF CUST(S48) EQ 0 S
            GOTO S22 S
        BYTE(S40,28)(QR22) = STD(CUST(S48)) S
        BYTE(S60,28)(QR22) = STD(SOLD(S48)) S
        IF CUST(S58) EQ 0 S
            GOTO S24 S
        BYTE(S40,28)(QR24) = STD(CUST(S58)) S
        BYTE(S60,28)(QR24) = STD(SOLD(S58)) S
        IF CUST(S68) EQ 0 S
            GOTO S26 S
        BYTE(S40,28)(QR26) = STD(CUST(S68)) S
        BYTE(S60,28)(QR26) = STD(SOLD(S68)) S
        IF CUST(S78) EQ 0 S
            GOTO S28 S
        BYTE(S40,28)(QR28) = STD(CUST(S78)) S
        BYTE(S60,28)(QR28) = STD(SOLD(S78)) S
        IF CUST(S88) EQ 0 S
            GOTO S30 S
        BYTE(S40,28)(QR30) = STD(CUST(S88)) S
        BYTE(S60,28)(QR30) = STD(SOLD(S88)) S
    END
    END

```

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```

IF CUST(S98) EQ 0 S
  GOTO 832 S
  BYTE(S40,28)(QR32) = STD(CUST(S98)) S
  BYTE(S40,28)(QR32) = STD(SOLD(S98)) S
NEXT. BYTE(S29,85)(QR12) = STD(IGNJCSH(SIS)) S
  BYTE(S29,85)(QR14) = STD(ARIPAR(SIS)) S
  BYTE(S29,85)(QR16) = STD(P)FACTR(SIS)) S
  BYTE(S29,85)(QR18) = STD(T)AVJCA(SIS)) S
  BYTE(S29,85)(QR23) = STD(ML2)90P(SIS)) S
  BYTE(S29,85)(QR29) = STD(ML3)90P(SIS)) S
  BYTE(S29,85)(QR27) = STD(ML4)80P(SIS)) S
  BYTE(S29,85)(QR29) = STD(ML5)80P(SIS)) S
  BYTE(S29,85)(QR31) = STD(AR)FACT(SIS)) S
  BYTE(S29,85)(QR36) = STD(FX)COS(SIS)) S
  BYTE(S29,85)(QR38) = STD(V)COST(SIS)) S
  BYTE(S29,85)(QR40) = STD(SALARY(SIS)) S
  BYTE(S29,85)(QR42) = STD(CONSTR(SIS)) S
  BYTE(S29,85)(QR44) = STD(HIRE(SIS)) S
  BYTE(S29,85)(QR46) = STD(RD(SIS)) S
  BYTE(S29,85)(QR48) = STD(ADS(SIS)) S
  BYTE(S29,85)(QR50) = STD(CONSULT(SIS)) S
  BYTE(S29,85)(QR52) = STD(DISBRS(SIS)) S
  BYTE(S29,85)(QR59) = STD(CA)LD(SIS)) S
  BYTE(S29,85)(QR56) = STD(PL)VAL(SIS)) S
  BYTE(S102,85)(QR12) = STD(CUM)RD(SIS)) S
  BYTE(S493)(QR6) = STD(I * 1) S
  BYTE(S67,48)(QR34) = STD(SALES(SIS)) S
  BYTE(S67,48)(QR39) = STD(INVTY(SIS)) S
  BYTE(S67,48)(QR41) = STD(WIP(SIS)) S
  BYTE(S67,48)(QR50) = STD(MEN(SIS)) S
  BYTE(S67,48)(QR48) = STD(FLD)LST(SIS)) S
  BYTE(S67,48)(QR50) = STD(ML2)LST(SIS)) S
  BYTE(S67,48)(QR52) = STD(ML3)LST(SIS)) S
  BYTE(S67,48)(QR54) = STD(ML4)LST(SIS)) S
  BYTE(S67,48)(QR56) = STD(WIR)LST(SIS)) S
  IF IMPRV(SIS) S
  BEGIN
    BYTE(S98,38)(QR14) = 3M( ) S
    RETURN S
  END
  BYTE(S98,38)(QR14) = 3M(NOT) S
  RETURN S
814. BYTE(S40,148)(QR14) = 14M( ) S
816. BYTE(S40,148)(QR16) = 14M( ) S
818. BYTE(S40,148)(QR18) = 14M( ) S
820. BYTE(S40,148)(QR20) = 14M( ) S
822. BYTE(S40,148)(QR22) = 14M( ) S
824. BYTE(S40,148)(QR24) = 14M( ) S
826. BYTE(S40,148)(QR26) = 14M( ) S
828. BYTE(S40,148)(QR28) = 14M( ) S
830. BYTE(S40,148)(QR30) = 14M( ) S
832. BYTE(S40,148)(QR32) = 14M( ) S
  GOTO NEXT S
END
ENC
PRCC I:CFQUR(INDEX) S
ITEM INDEX A 48 S S
BEGIN
  FOR I = INDEX S
  BEGIN

```

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```
BYTE(S102,85)(Q932) = BTD(BGN)CSH(SIS)) S
BYTE(S102,85)(Q934) = BTD(ARJPAR(SIS)) S
BYTE(S102,85)(Q936) = BTD(PJFACTOR(SIS)) S
BYTE(S102,85)(Q938) = BTD(TJAVJCA(SIS)) S
OPEN OUTPUT QPRINT S
FOR J = 0,1,2 S
  BEGIN
```

```
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q93 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q96 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q910 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q912 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q914 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q916 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q918 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q920 S
    OUTPUT QPRINT Q921 S
    OUTPUT QPRINT Q922 S
    OUTPUT QPRINT Q923 S
    OUTPUT QPRINT Q924 S
    OUTPUT QPRINT Q925 S
    OUTPUT QPRINT Q926 S
    OUTPUT QPRINT Q927 S
    OUTPUT QPRINT Q928 S
    OUTPUT QPRINT Q929 S
    OUTPUT QPRINT Q930 S
    OUTPUT QPRINT Q931 S
    OUTPUT QPRINT Q932 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q934 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q936 S
    OUTPUT QPRINT Q937 S
    OUTPUT QPRINT Q938 S
    OUTPUT QPRINT Q939 S
    OUTPUT QPRINT Q940 S
    OUTPUT QPRINT Q941 S
    OUTPUT QPRINT Q942 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q944 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q946 S
    OUTPUT QPRINT Q947 S
    OUTPUT QPRINT Q948 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q950 S
    OUTPUT QPRINT BLANK S
    OUTPUT QPRINT Q952 S
    OUTPUT QPRINT BLANK S
```

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```

OUTPUT QRPRINT QR54 S
OUTPUT QRPRINT QR55 S
OUTPUT QRPRINT QR56 S
OUTPUT QRPRINT BLANK S
OUTPUT QRPRINT QR58 S
POS(QRPRINT) = 0 S
END
SHUT OUTPUT QRPRINT S

END
ENC
PRCC LOG(FLXIMG)S
STEP FLXIMG M 120S ;;FLEXO IMAGE;;
STEP XR A 48 SS ;;SAVE INDEX REGS 1 AND 2 HERE;;
BEGIN ;;ROUTINE TO PRINT OUT UP TO 120 CHARACTERS ON THE FLEXO SUP-
PRESSING LEADING BLANKS;;
DIRECT
      JMP CRUC,Z S
      TXDLC 0,1 S
      TXDRC 0,2 S
      TDM XR S
      L L001 TIXZ 0,1 S
      L001 TIXZ 42,2 S
      L002 TMA FLXIMG,1 S
      SRA 0,2 S
      SLA 42 S
      TMD 0/60 S
      JAED (P)+2M S
      JMP L003 S
      TMD C/MLT,32762;C/MLTL,L002 S
      SIXJ 0,2 S
      TMD C/MLT,15;C/MLTR,L001 S
      AIXJ 1,1 S
      JMP OUT S
      L003 TAD S
      TDC S
      TMD C/MLT,32762;C/MLTR,L004 S
      SIXJ 0,2 S
      TMD C/MLT,15;C/MLTR,L005 S
      AIXJ 1,1 S
      L L004 JMP OUT S
      L004 TMA FLXIMG,1 S
      SRA 0,2 S
      SLA 42 S
      JMP L003 S
      L005 TIXZ 42,2 S
      JMP L004 S
      OUT TMD XR S
      TXDLC 0,1 S
      TXDRC 0,2 S

;OVSIAL
END ;;L00;;
PRCC FLEXINS
STEP XR A 48 S S ;; SAVE INDEX REG 1 HERE;;
STEP TEMP A 48 S S ;;TEMPORARY STORAGE...DIRECTOR OF TCM INSTRUCTION;;
BEGIN ;;ROUTINE TO INPUT UP TO 8 CHARACTERS FROM FLEXO. STOP CODE
ALLOWS RESTART FOR ERROR, CARRIAGE RETURN ENDS MESSAGE;;
DIRECT
      TXDLC 0,1 S
      TDM XR S

```

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AA	CM	UMPIRE,RESPOND	S
	JMP	CRUC,Z	S
L	TIXZ	0,1	S
BB	TMA	0/3272T47	S
	SRAQ	6	S
	CD		S
	TCH	TEMP	S
	JAED	OUT	S
	SRA	6	S
	SLAQ	6	S
	JAED	AA	S
	TDO		S
	TMA	UMPIRE,RESPOND	S
	SLA	6	S
	AQS	UMPIRE,RESPOND	S
	TMD	C/HLT,93C/HLTR,88	S
	AIXJ	1,1	S
OUT	TMD	XR	S
	TDXLC	0,1	S
ICVIAL			
END JIFLEXINJ			
PHCC CRUCS			
BEGIN			
DIRECT			
	TMD	0/32378	
	TDC	5	
	SCD	428	
	TDC	5	
JOVIAL			
ENC			
TEMP FIRST 8			

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```

START ITEM UMPIRE A 7 0 S
ITEM QTRONE H S
ITEM TEMP A 48 S S
ITEM TEAMJAO H 10 S
ITEM RESPOND H 8 S
ITEM BLANK H 10 S
ITEM QR3 H 112 S
ITEM QR6 H 112 S
ITEM QR10 H 112 S
ITEM QR12 H 112 S
ITEM QR14 H 112 S
ITEM QR16 H 112 S
ITEM QR18 H 112 S
ITEM QR20 H 112 S
ITEM QR21 H 112 S
ITEM QR22 H 112 S
ITEM QR23 H 112 S
ITEM QR24 H 112 S
ITEM QR25 H 112 S
ITEM QR26 H 112 S
ITEM QR27 H 112 S
ITEM QR28 H 112 S
ITEM QR29 H 112 S
ITEM QR30 H 112 S
ITEM QR31 H 112 S
ITEM QR32 H 112 S
ITEM QR34 H 112 S
ITEM QR36 H 112 S
ITEM QR37 H 112 S
ITEM QR38 H 112 S
ITEM QR39 H 112 S
ITEM QR40 H 112 S
ITEM QR41 H 112 S
ITEM QR42 H 112 S
ITEM QR44 H 112 S
ITEM QR46 H 112 S
ITEM QR47 H 112 S
ITEM QR48 H 112 S
ITEM QR50 H 112 S
ITEM QR52 H 112 S
ITEM QR54 H 112 S
ITEM QR55 H 112 S
ITEM QR56 H 112 S
ITEM QR58 H 112 S
FILE QRPRTY H 32767 H 112 V(TE) V(TPE) V(ENF) V(EOY) V(SET) V(OCC)
V(LEY) PRINT S
TABLE COSTS H A S S INDEX BY OS PLANTS S
BEGIN
ITEM COSTFIXED A 48 S S
REGIN 0.00 0.00 14.00 22.00 28.00 31.00 END
ITEM COSTVAR A 48 S S
REGIN 0.00 3.00 2.20 1.50 1.00 0.60 END
END
TABLE OR V 7 S D S
REGIN
ITEM HGNICSM A 48 S S
REGIN 102.00 102.00 102.00 102.00 102.00 102.00
102.00 END HGNICSM S
ITEM ARIPAR A 48 S S
REGIN 90.00 80.00 80.00 80.00 80.00 80.00

```

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```

      80.E3A0 END J1ARJPARJ1
ITEM PIFACTR A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END J1PIFACTR11
ITEM T1AVICA A 48 S $
RFGIA 182.8E3A0 182.8E3A0 182.8E3A0 182.8E3A0 182.8E3A0 182.8E3A0 182.8E3A0
182.8E3A0 END J1T1AVICA11
ITEM RL2190P A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM RL3190P A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM RL4190P A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM RL5190P A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM ARIFACT A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM FXICOST A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM VJICOST A 44 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM SALARY A 44 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM CONSTR A 44 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM WIRE A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM RM A 44 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM ADS A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM CONSULT A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM DISBRS A 44 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM CASHIC A 48 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM PAGES A 10 U $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM SALES A 10 U $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM MEN A 10 U $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM CUMINC A 44 S $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM IMPRV A $
RFGIA 0 0 0 0 0 0 0 0 END J1FOR IMPRV11
ITEM FLFILST A 10 U $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM RL21LST A 10 U $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM RL31LST A 10 U $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM RL41LST A 10 U $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM WIRILST A 10 U $
RFGIA 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 END
ITEM RLVAL A 44 S $
RFGIA 180.E3A0 180.E3A0 180.E3A0 180.E3A0 180.E3A0 180.E3A0 180.E3A0 180.E3A0

```

ENC
ENC


```

      T101FOUR(T) $ ;OUTPUT OF QR;
      END ;PROCESSING;
    STCF FIRST $
    ENR ;JUMPIRE;
    PHCC ACTREC(INDEX) $ ;COMPUTES FACTORED A/R CORRECTS FOR OVER-FACTOR;
    ITEM INDEX A 44 S $
    BEGIN
      FOR I = INDEX $
      BEGIN
        IF RL2190P(SIS) GE 9000 + AR12(SIS) $
          RL2190P(SIS) = 9000 + AR12(SIS) $
        IF RL3190P(SIS) GE 9000 + AR13(SIS) $
          RL3190P(SIS) = 9000 + AR13(SIS) $
        IF RL4190P(SIS) GE 8000 + AR14(SIS) $
          RL4190P(SIS) = 8000 + AR14(SIS) $
        IF RL5190P(SIS) GE 8000 + AR15(SIS) $
          RL5190P(SIS) = 8000 + AR15(SIS) $
        AR1FACT(SIS) = RL2190P(SIS) + RL3190P(SIS) + RL4190P(SIS)
          + RL5190P(SIS) $
        AR12(SIS) = AR12(SIS) - RL2190P(SIS) / 9000 $
        AR13(SIS) = AR13(SIS) - RL3190P(SIS) / 9000 $
        AR14(SIS) = AR14(SIS) - RL4190P(SIS) / 8000 $
        AR15(SIS) = AR15(SIS) - RL5190P(SIS) / 8000 $
      END
    END
    PHCC SPEND(INDEX) $
    ITEM INDEX A 44 S $
    BEGIN
      FOR I = INDEX $
      BEGIN
        FXICOST(SIS) = COSTFIXED(S0811(SIS)) $
        VICUST(SIS) = WIP(SIS) + COSTIVAR(S0811(SIS)) $
        SALARY(SIS) = 1000 + (FLD11(SIS) + TRNG12(SIS) + TRNG13(SIS)
          + TRNG14(SIS)) $
        ADS(SIS) = 300 + PACES(SIS) $
        DISHRS(SIS) = FXICOST(SIS) + VICUST(SIS) + SALARY(SIS)
          + CONSTN(SIS) + HIRE(SIS) + RD(SIS) + ADS(SIS)
          + CONSULT(SIS) $
      END
    END
    PHCC PRIVE(INDEX) $ ;UPDATES ACCUMULATED R AND D ;
    ITEM INDEX A 44 S $
    BEGIN
      FOR I = INDEX $
      BEGIN
        IF (MPRV(SIS) OR RD(SIS) EQ 0 $
        BEGIN
          CUMIND(SIS) = 0 $
          RETURN $
        END
        CUMIND(SIS) = CUMIND(SIS) + RD(SIS) $
      END
    END
    PHCC QUITTERS(INDEX) $ ;CONTROLS SALESMAN LOSSES;
    ITEM INDEX A 44 S $
    BEGIN
      FOR I = INDEX $
      BEGIN
        WTR15(SIS) = HIRE(SIS)/10000 $
        IF FLD11(SIS) NO 0 $

```

```

      FIGURE(FLD)1(SIS) = FLD)1(SIS),FLD)1LST(SIS)) S
      IF TRNG)2(SIS) NO 0 S
      FIGURE(TRNG)2(SIS) = TRNG)2(SIS),BL2)1LST(SIS)) S
      IF TRNG)3(SIS) NO 0 S
      FIGURE(TRNG)3(SIS) = TRNG)3(SIS),RL3)1LST(SIS)) S
      IF TRNG)4(SIS) NO 0 S
      FIGURE(TRNG)4(SIS) = TRNG)4(SIS),RL4)1LST(SIS)) S
      IF WTR)5(SIS) NO 0 S
      FIGURE(WTR)5(SIS) = WTR)5(SIS),WTR)1LST(SIS)) S
    END
  PHCC FIGURE(NUMBIN = NUMBOUT,LOSSES) S ;;DETERMINES SALESMAN LOSSES;;
  ITEM NUMBIN A 48 S S
  ITEM NUMBOUT A 48 S S
  ITEM LOSSES A 48 S S
  ITEM RANDUM A 7 U S
  BEGIN
    LOSSES = 0 S
    NUMBOUT = NUMBIN S
    FOR I = NUMBIN = 1, -1, 0 S
      BEGIN
        RAGEN(=RANDOM) S
        IF RANDUM LO S S
          BEGIN
            NUMBOUT = NUMBOUT - 1 S
            LOSSES = LOSSES + 1 S
          END
        END
      END
    END
  PHCC RAGEN(=RANDOM) S ;;PSEUDO RANDOM NUMBER GENERATOR;;
  TABLE GEN R 2 S
  BEGIN
    ITEM NGEN A 48 S S
    BEGIN 0(0429434430110475) 0(1272343473274254) END
  END
  ITEM PRNUMB A 7 U S ;;OUTPUT PARAMETER;;
  ITEM TEMPRN A 48 S S
  BEGIN
    GEN. TEMPRN = NGEN(S08) * NGEN(S15) S
    NGEN(S08) = BIT(S10,275)(TEMPRN) S
    PRNUMB = BIT(S33,75)(NGEN(S08)) S
    IF PRNUMB GR 99.40 S
      GO TO GEN S
    END
  PHCC BYT(NAS)
  ITEM BYT M 08
  ITEM NA A 48 S S
  ITEM XR A 48 S S
  BEGIN ;;CONVERTS BINARY NA TO BCH;;
    DIRECT
    TABLE
      YX)LC 0,1 S
      TD)  BYT,XR S
      T)A  0/6060A060606060 S
      T)A  BYT,RTD S
      T)XZ 0,1 S
      CA)A  BYT,NN S
      S)AQ 48 S
      DA)  0/10 S
      A)  0/50T47 S
      SL)  0,1 S

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```

      AWCS      BTE.ATD      $
      CA        $
      JAGQ      (P)+3H      $
      T44      C/PLT.481C/HLT.(P)-6H$
      ATXJ      6,1        $
      T4D      BTE.XR      $
      TDYLC      0,1        $
UCVIAL
END :JDTDIJ
PRCC DTB(MH)S
ITEM DTB A 47 US
ITEM MH M R
ITEM PWSTEN A 47 US
REGIA JACONVFHT NCM MH TO BINARY DTDIJ
DIRECT
      CM      DT+.DTH      SCLEAR DTR.
      T44      0/1842      SSET 1 INTO PWSTEN FOR
      T41      DTB.PWSTEN$1ST MULTIPLICATION.
      C7       $
      T44      DT+.MH      SCLEAR U.
      SC1      6          SGEI MH CYCLE HIGH 6
      T44      DT+.MH      SAND PLACE BACK IN MH.
      T44      DT+.MH      $
      SR4J      6          SSHIFT ACTIVE RYTE
      T44      0/43        SINTO 3 SCALED HS IN 0
      JAGQ      (P)+3H      SIF BLANK, SKIP RYTE.
      M1        DTB.PWSTEN$MULT. BY PWSTEN SCALED
      A44      DTB.DTH      $B42.PHODUCT B47 IN A.
      T41      0/10R5      SMULT PWSTEN BY 10 AND
      MH        DTB.PWSTEN$EXIT ROUTINE WHEN
      T41      0/1ER      SPWSTEN=100,000,000
      JAGQ      (P)+4H      SFEANING LAST RYTE.
      SL1      5          SRESCALE PWSTEN TO M42
      T44      DTB.PWSTEN$
      J4P      (P)-15H      SREPEAT FOR NEXT RYTE.
UCVIAL
END :JDTDIJ
PRCC HRL(INDEX) 3 JADVANCES BOARD ITEMS AND SOME ON ITEMS:
ITEM INDEX A 41 9 4
REGIA
FOR I = INDEX 5
REGIA
IF SALES(SIS) GR INVTY(SIS) 5
REGIA
SALES(SIS) = INVTY(SIS) 5
LCG199(SALES HAVE BEEN REDUCED TO THE NUMBER OF UNITS IN INVEN
TORY) 5
END
INVTY(SIS) = INVTY(SIS) - SALES(SIS) 5
CA94J1(SIS) = ARJ2(SIS) 5
ARJ2(SIS) = ARJ3(SIS) 5
ARJ3(SIS) = ARJ4(SIS) 5
ARJ4(SIS) = ARJ5(SIS) 5
ARJ5(SIS) = SALES(SIS) 5
MEN(SIS) = FLUJ1(SIS) + TRNQJ2(SIS) + TRNQJ3(SIS) + TRNQJ4(SIS)
+ WIRJ5(SIS) 5
CAJLJDR(SIS) = TJAVJCA(SIS) - DISBRJ(SIS) 5
INVTY(SIS) = INVTY(SIS) + WIP(SIS) 5
WIP(SIS) = SCMED(SIS) 5
SCMED(SIS) = " 5
OSJ1(SIS) = OSJ1(SIS) + CONJ2(SIS) 5

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```

CCN12(SIS) = CCN13(SIS) $
IFEXTN CS11(SIS) + CCN12(SIS) GU 1 $
CCN13(SIS) = CONSTR(SIS)/30000 $
CRIF CONSTR(SIS) GC 150000 $
CCN13(SIS) = 1 + (CONSTR(SIS) - 150000)/30000 $
CRIF CONSTR(SIS) GC 0 $
REGIA
  CCN12(SIS) = 0 $
  CCN13(SIS) = 0 $
END
END11ALTERNATIVE11
FLD11(SIS) = FLD11(SIS) + THNG12(SIS) $
THNG12(SIS) = THNG13(SIS) $
THNG13(SIS) = THNG14(SIS) $
THNG14(SIS) = HIR15(SIS) $
HIR15(SIS) = 0 $
PL1VAL(SIS) = PL1VAL(SIS) + CONSTR(SIS) $
END
ENT
PRCC RESET(INDEX) $ 11RESFIS OR FOR NEXT QUARTER11
ITEM INDEX A 4H $ $
REGIA
  FCH I = INDEX $
  REGIA
    BGNICSH(SIS) = CAILJDB(SIS) $
    ARIPAR(SIS) = 10000 + CASH11(SIS) $
    PIFACTR(SIS) = AMFACT(SIS) $
    Y1AVICA(SIS) = BGNICSH(SIS) + ARIPAR(SIS) + PIFACTR(SIS) $
    BL2IGOP(SIS) = 0 $
    BL3IGOP(SIS) = 0 $
    BL4IGOP(SIS) = 0 $
    BL5IGOP(SIS) = 0 $
    ARIFACT(SIS) = 0 $
    FXICOST(SIS) = 0 $
    VICOST(SIS) = 0 $
    SALARY(SIS) = 0 $
    CONSTR(SIS) = 0 $
    WTRF(SIS) = 0 $
    REINTS = 0 $
    ACS(SIS) = 0 $
    CRNSLLT(SIS) = 0 $
    DTSHAS(SIS) = 0 $
    CAILJDB(SIS) = 0 $
    PAGES(SIS) = 0 $
    BALLS(SIS) = 0 $
    MFL(SIS) = 0 $
    I-PMV(SIS) = 0 $
    FIDJLST(SIS) = 0 $
    BL2JLST(SIS) = 0 $
    BL3JLST(SIS) = 0 $
    BL4JLST(SIS) = 0 $
    WIRJLST(SIS) = 0 $
  END
END
PRCC IICIONE $
REGIA
  LCQ(2AMHON PAY YEARS ARE PLAYING) $
  FIEXTN $
  REFT(QR) = DTSHRESPOND $
END

```

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```

PHCC I(1)T=0(INDEX) S
ITEV INDEX A 4H S S
BEGIN
  FOR I = INDEX S
  BEGIN
    IF I EQ 0 S
    BEGIN
      LOG(13H(PLEASE ENTER THE FOLLOWING VALUES)) S
      LOG(14H(QUARTER NUMBER)) S
      FLEXIN S
      BYTE(132,25)(Q46) = RESPOND S
      TEMP = DT(RESPOND) + 1 S
      BYTE(132,25)(Q47) = RTD(TEMP) S
      END
      BYTE(139S)(TEAMING) = RTD(I + 1) S
      LOG(TEAMING) S
      LOG(15H(UNITS SOLD)) S
      FLEXIN S
      SCHED(15) = DT(RESPOND) S
      LOG(17H(LOCK 2 FACTORING)) S
      FLEXIN S
      BL2190P(15) = DT(RESPOND) S
      LOG(17H(LOCK 3)) S
      FLEXIN S
      BL3190P(15) = DT(RESPOND) S
      LOG(17H(LOCK 4)) S
      FLEXIN S
      BL4190P(15) = DT(RESPOND) S
      LOG(17H(LOCK 5)) S
      FLEXIN S
      BL5190P(15) = DT(RESPOND) S
      LOG(12H(CONSTRUCTION)) S
      FLEXIN S
      CLNSTR(15) = DT(RESPOND) S
      LOG(16H(MIRING)) S
      FLEXIN S
      WTR(15) = DT(RESPOND) S
      LOG(17H(AND 0)) S
      FLEXIN S
      RM(15) = DT(RESPOND) S
      LOG(10H(CONSULTING)) S
      FLEXIN S
      CONSULT(15) = DT(RESPOND) S
      LOG(13H(AS)) S
      FLEXIN S
      PAGE9(15) = DT(RESPOND) S
      LOG(16H(SALES)) S
      FLEXIN S
      SALES(15) = DT(RESPOND) S
      IF SALES(15) EQ 0 S
      BEGIN
        LOG(24H(CUSTOMERS AND UNITS SOLD)) S
        FOR J = 0,1,2 S
        BEGIN
          FLEXIN S
          CUST(15) = DT(RESPOND) S
          IF CUST(15) EQ 0 S
          GOT0 SET0 S
          FLEXIN S
          SOLD(15) = DT(RESPOND) S

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```

TEST *
SETUP FOR K = J, 1, 9 *
REGIN
CUST($K) = 0 *
SOLD($K) = 0 *
END
GOTO NEXT *
END
NEXT
LOG(17H(PROJ)CT IMPROVEMENT, 1 OR 0) *
FLEXIN *
IMPRV($I) = DTR(RESPOND) *
LOG(17H(PROJ) LINES CANCELED) *
FLEXIN *
TEMP = DTR(RESPOND) *
PLIVAL($IS) = PLIVAL($IS) - 30000 * TEMP *
CS11($IS) = CS11($IS) - TEMP *
END
PHCC_I(CIT)=REC(INDEX) *
IIE= IADFX A 44 * S *
REGIN
FOR I = INDEX *
-EGIN
IF CUST($0) EQ 0 *
GOTO $14 *
BYTE($48,25)(QR14) = BYD(CUST($0)) *
BYTE($A0,25)(QR14) = BYD(SOLD($0)) *
IF CUST($1) EQ 0 *
GOTO $14 *
BYTE($48,25)(QR16) = BYD(CUST($1)) *
BYTE($A0,25)(QR16) = BYD(SOLD($1)) *
IF CUST($2) EQ 0 *
GOTO $14 *
BYTE($48,25)(QR18) = BYD(CUST($2)) *
BYTE($A0,25)(QR18) = BYD(SOLD($2)) *
IF CUST($3) EQ 0 *
GOTO $20 *
BYTE($48,25)(QR20) = BYD(CUST($3)) *
BYTE($A0,25)(QR20) = BYD(SOLD($3)) *
IF CUST($4) EQ 0 *
GOTO $22 *
BYTE($48,25)(QR22) = BYD(CUST($4)) *
BYTE($A0,25)(QR22) = BYD(SOLD($4)) *
IF CUST($5) EQ 0 *
GOTO $24 *
BYTE($48,25)(QR24) = BYD(CUST($5)) *
BYTE($A0,25)(QR24) = BYD(SOLD($5)) *
IF CUST($6) EQ 0 *
GOTO $26 *
BYTE($48,25)(QR26) = BYD(CUST($6)) *
BYTE($A0,25)(QR26) = BYD(SOLD($6)) *
IF CUST($7) EQ 0 *
GOTO $28 *
BYTE($48,25)(QR28) = BYD(CUST($7)) *
BYTE($A0,25)(QR28) = BYD(SOLD($7)) *
IF CUST($8) EQ 0 *
GOTO $30 *
BYTE($48,25)(QR30) = BYD(CUST($8)) *
BYTE($A0,25)(QR30) = BYD(SOLD($8)) *

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```

IF CLST(99) EQ U *
  GOTO S12 *
  NEXT,
  BYTE($40,23)(QR32) = BTD(CUST($95)) S
  BYTE($40,23)(QR32) = BTD(SOLD($95)) S
  BYTE($29,85)(QR12) = BTD(AGNCSH($IS)) S
  BYTE($29,85)(QR14) = BTD(ARJPAR($IS)) S
  BYTE($29,85)(QR16) = BTD(PJFACTR($IS)) S
  BYTE($29,85)(QR18) = BTD(TJAVICA($IS)) S
  BYTE($29,85)(QR23) = BTD(BL2100P($IS)) S
  BYTE($29,85)(QR25) = BTD(BL3100P($IS)) S
  BYTE($29,85)(QR27) = BTD(BL4100P($IS)) S
  BYTE($29,85)(QR29) = BTD(BL5100P($IS)) S
  BYTE($29,85)(QR31) = BTD(ARJFACT($IS)) S
  BYTE($29,85)(QR33) = BTD(FXJCOST($IS)) S
  BYTE($29,85)(QR35) = BTD(VICOST($IS)) S
  BYTE($29,85)(QR41) = BTD(SALARY($IS)) S
  BYTE($29,85)(QR42) = BTD(CONBTR($IS)) S
  BYTE($29,85)(QR44) = BTD(HIRE($IS)) S
  BYTE($29,85)(QR46) = BTD(RD($IS)) S
  BYTE($29,85)(QR48) = BTD(AUS($IS)) S
  BYTE($29,85)(QR50) = BTD(CONBULT($IS)) S
  BYTE($29,85)(QR52) = BTD(DISBRS($IS)) S
  BYTE($29,85)(QR55) = BTD(CALJIDH($IS)) S
  BYTE($29,85)(QR57) = BTD(PLJVAL($IS)) S
  BYTE($102,45)(QR12) = BTD(CUMJRD($IS)) S
  BYTE($49,35)(QR46) = BTD(T + 1) S
  BYTE($67,45)(QR34) = BTD(SALES($IS)) S
  BYTE($67,45)(QR36) = BTD(INVTY($IS)) S
  BYTE($67,45)(QR41) = BTD(WIP($IS)) S
  BYTE($67,45)(QR54) = BTD(PEN($IS)) S
  BYTE($67,45)(QR48) = BTD(PLJLST($IS)) S
  BYTE($67,45)(QR50) = BTD(BL2JLST($IS)) S
  BYTE($67,45)(QR52) = BTD(BL3JLST($IS)) S
  BYTE($67,45)(QR54) = BTD(BL4JLST($IS)) S
  BYTE($67,45)(QR56) = BTD(WIRJLST($IS)) S
  IF IMPRV($IS) S
  BEGIN
    BYTE($98,35)(QR14) = 3M( ) S
    RETURN S
  END
  END
  BYTE($98,35)(QR14) = 3M( ) S
  RETURN S
  S14. BYTE($40,145)(QR14) = 14M( ) S
  S16. BYTE($40,145)(QR16) = 14M( ) S
  S18. BYTE($40,145)(QR18) = 14M( ) S
  S20. BYTE($40,145)(QR20) = 14M( ) S
  S22. BYTE($40,145)(QR22) = 14M( ) S
  S24. BYTE($40,145)(QR24) = 14M( ) S
  S26. BYTE($40,145)(QR26) = 14M( ) S
  S28. BYTE($40,145)(QR28) = 14M( ) S
  S30. BYTE($40,145)(QR30) = 14M( ) S
  S32. BYTE($40,145)(QR32) = 14M( ) S
  GOTO NEXT *
END
END
PNCJ ISCJFCUR(INDEX) S
ITER INFR A 4# S S
BEGIN
  FOR I = INDXA S
  BEGIN

```

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```

-----
BYTE(S102,85)(Q052) = RTD(RUNJCSH(S14)) $
BYTE(S102,85)(Q054) = RTD(ARIPAR(S15)) $
-----
BYTE(S102,85)(Q056) = RTD(PIFACTR(S16)) $
BYTE(S102,85)(Q058) = RTD(TJAVICA(S17)) $
OPEN OUTPUT QPRINT $
FOR J = 1,2 $
  BEGIN
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q03 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q06 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q10 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q12 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q14 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q16 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q18 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q20 $
    OUTPUT QPRINT Q21 $
    OUTPUT QPRINT Q22 $
    OUTPUT QPRINT Q23 $
    OUTPUT QPRINT Q24 $
    OUTPUT QPRINT Q25 $
    OUTPUT QPRINT Q26 $
    OUTPUT QPRINT Q27 $
    OUTPUT QPRINT Q28 $
    OUTPUT QPRINT Q29 $
    OUTPUT QPRINT Q30 $
    OUTPUT QPRINT Q31 $
    OUTPUT QPRINT Q32 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q34 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q36 $
    OUTPUT QPRINT Q37 $
    OUTPUT QPRINT Q38 $
    OUTPUT QPRINT Q39 $
    OUTPUT QPRINT Q40 $
    OUTPUT QPRINT Q41 $
    OUTPUT QPRINT Q42 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q44 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q46 $
    OUTPUT QPRINT Q47 $
    OUTPUT QPRINT Q48 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q49 $
    OUTPUT QPRINT BLANK $
    OUTPUT QPRINT Q50 $
    OUTPUT QPRINT BLANK $

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```

OUTPUT QRRPRINT QRS4 S
OUTPUT QRRPRINT QRS5 S
OUTPUT QRRPRINT QRS6 S
OUTPUT QRRPRINT BLANK S
OUTPUT QRRPRINT QRS8 S
PCS(CHPRINT) = 0 S
END
SHUT OUTPUT QRRPRINT S
END
ENC
PHCC LOG(FLEXING)S
ITEM FLEXING M 120S ;;FLEXO IMAGE;;
ITEM XR A 48 S ;;SAVE INDEX REGS 1 AND 2 HERE;;
BEGIN ;;ROUTINE TO PRINT OUT UP TO 120 CHARACTERS ON THE FLEXO SUP-
PRESSING LEADING BLANKS;;
DIRECT
      J4P      CRWC.2      S
      TXKLC    0,1        S
      TXKRC    0,2        S
      T47      XR         S
      L        TIXZ    0,1      S
      LG01     TIXZ    42,2      S
      LG02     T4A      FLEXING,1  S
      SR4      0,2        S
      SL4      42         S
      T47      0/60       S
      J4P      (P)+2M     S
      J4P      LG03       S
      T47      C/PL1,32762IC/MLTL,LG02  S
      SIXJ     0,4        S
      T47      C/PLT,15IC/MLTR,LG01     S
      AT4J     1,1        S
      J4P      001        S
      LG03     T47      S
      T47      C/PLT,32762IC/MLTH,LG04   S
      SIXJ     0,4        S
      T47      C/PLT,15IC/MLTR,LG05     S
      AT4J     1,1        S
      J4P      001        S
      LG04     T4A      FLEXING,1  S
      SR4      0,2        S
      SL4      42         S
      J4P      LG03       S
      LG04     TIXZ    42,2      S
      J4P      LG04       S
      OUT      T47      XR         S
      TXKLC    0,1        S
      TXKRC    0,2        S
      C/VIAL
      LAF (LOG)S
      PHCC FLEXING
      ITEM XR A 48 S ;;SAVE INDEX REG 1 HERE;;
      ITEM TEMP A 48 S ;;TEMPORARY STORAGE...DIRECTION OF TCM INSTRUCTIONS;;
      BEGIN ;;ROUTINE TO INPUT UP TO 8 CHARACTERS FROM FLEXO. STOP CODE
      ALLOWS RESTART FOR ERRORS. CARRIAGE RETURN ENDS MESSAGE;;
      DIRECT
      TXKLC    0,1        S
      T47      XR         S
      AA      C4      UMPIRE.RESPOND  S

```

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(Last Page)

	JHP	CRUC.Z	S
L	TIXZ	0.1	S
BB	T4A	0/3272T47	S
	SRAQ	5	S
	CO		S
	TCH	TEMP	S
	JAED	OUT	S
	SRA	5	S
	SLAQ	6	S
	JAED	AA	S
	TCH		S
	T4A	UMFIRE,RESPOND	S
	SLA	6	S
	AQS	UMFIRE,RESPOND	S
	T4A	C/HLT,9IC/HLTR,BB	S
	ATXJ	1,1	S
OUT	T4A	XR	S
	TDXLC	0,1	S

JOVIAL
 END JFLEXINJ
 PHCC CRUCS
 BEGIN
 DIRECT

	T4A	0/3237S
	TDC	S
	SCD	42S
	TDC	S

JOVIAL
 END
 TERM FIRST S

UNCLASSIFIED

System Development Corporation,
Santa Monica, California
BUSINESS MANAGEMENT GAME, PART III:
INSTRUCTIONS FOR THE USE AND MODIFI-
CATION OF PROGRAM UMPIRE. Scientific
rept., TM-1088/002/00, by S. Peterson.
20 May 1963, 64p.

Unclassified report

DESCRIPTORS: Management Engineering.

UNCLASSIFIED

Describes the use, modification and
maintenance of program UMPIRE, a pro-
gram written in JOVIAL for the Philco
2000, to be used in the play of the
management game described in TM-1088.

UNCLASSIFIED

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